

NON-PUBLIC?: N  
ACCESSION #: 9005110218  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Salem Generating Station - Unit 1 PAGE: 1 OF 5

DOCKET NUMBER: 05000272

TITLE: Rx. Trip From 90% Power on No. 12 S/G L-L Level Due To An  
Equipment Failure  
EVENT DATE: 04/09/90 LER #: 90-012-00 REPORT DATE: 05/09/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 090

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: M. J. Pollack - LER Coordinator TELEPHONE: (609) 339-2022

COMPONENT FAILURE DESCRIPTION:  
CAUSE: B SYSTEM: SJ COMPONENT: MO MANUFACTURER: D055  
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

#### ABSTRACT:

On 4/9/90 at 1433 hours, during normal power operations, a reactor trip on No. 12 Steam Generator (S/G) Low-Low Level occurred. Prior to the trip, at 1430 hours, after noting that No. 12 Steam Generator Feedwater Pump (SGFP) was idling, a turbine runback was initiated at 200%/min then was reduced to 15%/min once steam flow and feed flow were matched. Upon reaching 60% power, the runback stopped. However, No. 12 S/G level continued to decrease. A second runback to 50% power (at 8%/min) was initiated, however, prior to its completion, the Low-Low Level trip setpoint (16%) was reached. The Unit was stabilized in Mode 3. The root cause of this event is equipment failure. Flow from the No. 12 SGFP had ceased upon failure of the governor valve control linkage. The pilot rod that diverts oil flow to position the servo motor piston had dropped off. The loss of the pilot rod prevented the Woodward Governor from controlling the turbine. The No. 12 SGFP governor valve linkage was repaired and No. 11 SGFP governor valve linkage inspected with no related

problems noted. Additional corrective action include: 1) Maintenance procedure M24A will be revised to incorporate more detailed instructions for linkage installation and adjustment; 2) a procedure, to define preventive maintenance requirements will be prepared; 3) recurring tasks will be established as applicable; and 4) a review of similar pump governor linkage arrangements with no additional problems identified.

END OF ABSTRACT

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#### PLANT AND SYSTEM IDENTIFICATION:

Westinghouse - Pressurized Water Reactor

Energy Industry Identification System (EIIS) codes are identified in the text as xx

#### IDENTIFICATION OF OCCURRENCE:

Reactor Trip From 90% Power on No. 12 Steam Generator Low-Low Level Due to an Equipment Failure

Event Date: 4/09/90

Report Date: 5/09/90

This report was initiated by Incident Report No. 90-240.

#### CONDITIONS PRIOR TO OCCURRENCE:

Mode 1 Reactor Power 90% - Unit Load 1020 MWe

#### DESCRIPTION OF OCCURRENCE:

On April 9, 1990 at 1433 hours, during normal power operations, a reactor trip JC on No. 12 Steam Generator (S/G) Low-Low Level occurred.

Prior to the trip, at 1430 hours, all four S/G level program deviation alarms annunciated in the Control Room. The shift, after verifying the alarm and noting that No. 12 Steam Generator Feedwater Pump (SGFP) SJ was idling, initiated a turbine runback at 200% per minute then reduced it to 15% per minute once steam flow and feed flow were matched. Also, prior to the runback, it was observed that steam flow was indicating greater than feed flow by approximately

30%.

Upon reaching 60% power, the runback stopped automatically. Nos. 11, 13, and 14 S/Gs indicated matched steam flow/feed flow signals, however, No. 12 S/G level continued to decrease. A second turbine runback to 50% power (at 8% per minute to minimize shrink) was initiated; however, the Low-Low Level trip setpoint (16%) was reached prior to reaching 50% power. The Unit was then stabilized in Mode 3.

On April 9, 1990 at 1503 hours, the Nuclear Regulatory Commission was notified of the actuation of the Reactor Protection System (RPS) JC in accordance with Code of Federal Regulations 10CFR 50.72 (b) (2) (ii).

#### APPARENT CAUSE OF OCCURRENCE:

The root cause of this event is equipment failure. Flow from No. 12 SGFP ceased due to failure of the governor valve control linkage. The pilot rod that diverts oil flow to position the servo motor piston dropped off, in effect going to the minimum steam position. The loss of the pilot rod prevented the Woodward Governor from controlling the

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#### APPARENT CAUSE OF OCCURRENCE: (cont'd)

turbine since the linkage that communicates the valve position signal dropped off.

Investigation identified several contributing factors to the governor valve linkage failure: the oilite bearing (bushing) was missing; the jam nut was installed upside down; and Maintenance Procedure M24A, "Steam Generator Feedwater Pump Turbine Inspection" does not verify that the jam nut is locked.

With the oilite bushing missing, the pinstraight (linkage pin) and jam nut would have been exposed to additional vibration. Also, with the jam nut installed upside down, it would be more apt to loosen. Two (2) possibilities could explain why the bushing was missing: 1) it was omitted during a previous reassembly of the governor valve linkage or 2) it was installed, but became damaged during feed pump operation and either worked itself free or disintegrated.

Another contributor to the reactor trip was the recent revision of

the S/G Low-Low Level trip setpoint from 8.5% to 16%. Two (2) prior loss of SGFP events were reviewed (both in January of 1987) where the loss of a SGFP did not result in a reactor trip. One event was associated with Salem Unit 2 where S/G levels reached a minimum level of 10%. The other event occurred on Salem Unit 1 where No. 12 S/G reached a level of 14%. In both cases, a reactor trip would have resulted with the 16% setpoint.

#### ANALYSIS OF OCCURRENCE:

The S/G low-low level reactor trip prevents operation with the steam generator water level below the minimum volume required for adequate heat removal. The trip is actuated on two out of three low-low water level signals in any S/G. The setpoint ensures adequate S/G inventory, at the time of a reactor trip, to allow for possible starting delays of the Auxiliary Feedwater Pumps BA ; thus preventing S/G dryout and Reactor Coolant System AB thermal and hydraulic transients associated with a loss of the heat sink.

The RPS functioned as designed and the heat sink was maintained during this event. Since the RPS is designed to withstand the thermal and hydraulic effects of four-hundred (400) reactor trips from full power and this was the 166<sup>th</sup> trip, this event involved no undue risk to the health or safety of the public. However, due to the actuation of the RPS, this event is reportable in accordance with Code of Federal Regulations 10CFR 50.73 (a) (2) (iv).

During this event, the Control Room operators observed that the Control Rods appeared to step in slower than expected (when placed in "Auto") for a 5 degree F difference in Tave and Tref. Maintenance and Technical Department personnel investigated the performance of the Rod Control System and found no problems related to the possible delayed system response. Procedures used in support of testing include 1IC-5.1-006 ("Full Length Rod Control System Automatic Control Rod

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#### ANALYSIS OF OCCURRENCE: (cont'd)

Speed Verification") and 1PD-2.1.051 ("1QM-412A Tave High Reactor Control System (Channel Calibration Procedure").

The Control Rods were placed in "Auto" when Tave reached 4-50 11 above the program value. When the Control Rods were placed in "Auto" Tave and Tref were already trending down due to operation of the

Turbine Bypass System (Steam Dumps). This would result in the control rods stepping in slower than the maximum rate (72 steps per minute). This feature in conjunction with the above test results indicates that the system functioned as designed. The maximum T\*\*ave reached did not affect the safety of the plant. No Technical Specification identified limitations were exceeded.

**CORRECTIVE ACTION:**

The No. 12 SGFP governor valve linkage was repaired. Additionally, the No. 11 SGFP governor valve linkage was inspected, with no related problems identified.

Maintenance procedure M24A will be revised to incorporate more detailed instructions for linkage installation and adjustment.

Preparation of a new procedure, to define the requirements for preventive maintenance inspections (every 18 months), has been initiated.

A recurring task will be established to visually inspect the SGFP governor linkage for loose parts.

Prior to the Unit 2 restart, the No. 21 and No. 22 SGFP governor linkages will be inspected.

Similar pump governor linkage arrangements were reviewed. The No. 13(23) Auxiliary Feedwater Pump arrangements were visually inspected for loose parts. None were found. Also, the six Unit 1 and Unit 2 Diesel Generators (D/Gs) governor arrangements were inspected, although these arrangements are not similar to the SGFP governor arrangement. No problems were identified which affected the functioning of the D/G governor.

General Manager -  
Salem Operations

MJP:pc

SORC Mtg. 90-048

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Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038

Salem Generating Station May 09, 1990

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

Dear Sir:

SALEM GENERATING STATION  
LICENSE NO. DPR-70  
DOCKET NO. 50-272  
UNIT NO. 1  
LICENSEE EVENT REPORT 90-012-00

This Licensee Event Report is being submitted pursuant to the requirements of the Code of Federal Regulations 10CFR 50.73(a)(2)(iv). This report is required within thirty (30) days of discovery.

Sincerely yours,

L. K. Miller  
General Manager -  
Salem Operations

MJP:pc

Distribution

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